

Over time, consistent hardware defines intuitive interaction...

CONSISTENCY in CROSS-DEVICE NAVIGATION

Doing it with XEEL

September 10, 2002

<http://innovate/xeel>

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XUX
EXPERIMENTAL USER EXPERIENCE

Windows Hardware Experience Group

2004 Hard/Soft Interaction Fundamentals

- » Power & Security Buttons, Biometrics
- » RTC – Annotation, Telephony, Meetings
- » Notifications, Indicators, Aux Displays
- » **Navigation**, Media Transport, Remotes
- » Multi-Mon, Tablet Docking, HIDs
- » Portable Personal Storage



XuX
SIGNATURE

XEEL Overview

Tablet PC, Mira, eHome, Pocket PC, SmartPhone, Zenith require dedicated buttons for info nav & media consumption.

Cross-product consistency provides:

- » usability & productivity benefits
- » signature -> MS market advantage

Scenarios

A Tablet PC user reviews a report that was distributed in a meeting. Then, in an inconspicuous way, reads her email during the presentation without touching the screen with her stylus...

On the bus, a Zenith user scans news headlines on his watch wondering when the market is going to recover...

At home, a Mira user sits on his couch with one hand resting on his golden retriever and surfs the New York Times on the web...

Standing in line at the coffee shop, a SmartPhone user retrieves a client's phone number and calls to confirm that the parts arrived on time...

In an 8"x12" dorm, an eHome user browses her music collection with a remote control and chooses a playlist that inspires...

A shopper in a computer superstore picks up a new Microsoft device and immediately knows how to use it...



Opportunity

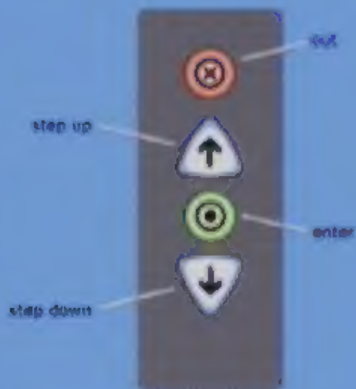
Casio defined what became "intuitive" wristwatch user interfaces in the late 70's and early 80's for generations of timepiece wearers.

We have a similar opportunity to define what could become intuitive for people who regularly use multiple Microsoft products in the span of their daily lives.

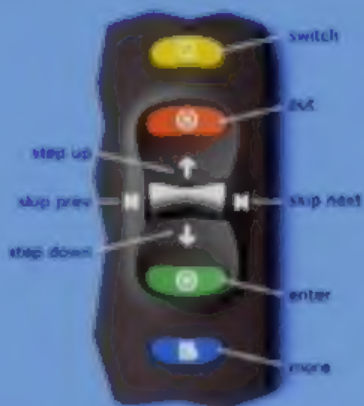
Framework

- Two overlapping cross-product hard/soft user experience initiatives:
 - Cross-UX Signature Task Force
 - Cross-UX Wheel (XEEL) Task Force
- Both groups involve participants from multiple disciplines across divisions.
- Target rollout in the Longhorn/Office 2004 "better together" timeframe, and therefore believe we need to have hardware spec's complete by Sept/Oct 2002. Schedule and priorities roll back from there.

Functional Snapshot



Bare Minimum Set



Full Navigation Set
(preferred embodiment)

Program Goals

- » small set of easy to use hardware-based software controls for navigation and information consumption
- » scale across all important applications, key media types and data contexts
- » scale to fit all Microsoft device platforms & form factors
- » build on success of mouse wheel, map to a variety of hardware switch & controller types
- » reliable & consistent implementation across Microsoft platforms
- » reliable & consistent implementation by leading software apps
- » reliable & consistent implementation across hardware platform types by leading Microsoft device OEMs & CDMs

Non-Goals

- » not a replacement for random-roam devices, such as mice and styli
- » not designed to accommodate content creation and data production
- » not intended to support competing OS platforms running on similar or identical hardware (i.e. the hardware/software combination is critical)

Business Justification

- participants learned to use XEEL quickly and saw its advantages
- participants judged the pen & XEEL combination on tablet devices as highly useful
- people seem willing to pay more for a tablet with dedicated hardware navigation controls
- mapping not hardware specific (enables OEMs to compete on hardware implementations for market differentiation while safely providing a consistent user interface across brands)
- providing a common navigation signature across Microsoft platforms may increase the cross sell from one Microsoft platform to another
- about 80-90% ready today with existing or forthcoming pre-Longhorn software and devices. What's needed most are:
 - Cleanup of non-compliant key event mappings in Windows and Office;
 - Evangelism to each division's respective hardware OEMs & ODMs for Longhorn timeframe form factors.

Value Proposition

Cross-Product Scalability

	Single screen devices without cursor control		Single Pane UI w/o cursor	Multi-Pane UI w optional cursor control	
Generic XCEL Term	SPO - Zenith (wristwatch)	Singer (smart phone)	eHome (10' remote)	Mira v2	Tablet PC v2
STEP UP	PREV	UP	UP	UP	UP
STEP DN	NEXT	DOWN	DOWN	DOWN	DOWN
SKIP NEXT	.	RIGHT	RIGHT	SKIP NEXT	SKIP NEXT
SKIP PREV		LEFT	LEFT	SKIP PREV	SKIP PREV
ENTER	ENTER	OK (soft key)	OK	ENTER	ENTER
OUT	CHANNEL	BACK	BACK	OUT	OUT
MORE		soft key)	DETAILS	MORE	MORE
SWITCH	.	HOME	SLIDE	SWITCH	SWITCH



Requirements

1. *Identify the problem*

2. *Define the problem*

3. *Generate hypotheses*

4. *Test the hypotheses*

Cross-Product Scalability

	Single screen devices without cursor control		Single Pane UI w/o cursor	Multi-Pane UI w optional cursor control	
Generic	SPD - Zenith	Stinger	eHome (10'	Mira v2	Tablet PC
WHEEL left	(wristwatch)	(smart phone)	remote)		v2
STEP UP	PREV	UP	UP	UP	UP
STEP DN	NEXT	DOWN	DOWN	DOWN	DOWN
SKIP NEXT	.	RIGHT	RIGHT	SKIP NEXT	SKIP NEXT
SKIP PREV		LEFT	LEFT	SKIP PREV	SKIP PREV
ENTER	ENTER	OK (soft key)	OK	ENTER	ENTER
OUT	CHANNEL	BACK	BACK	OUT	OUT
MORE		soft key)	DETAILS	MORE	MORE
SWITCH		HOME	SLIDE	SWITCH	SWITCH



Requirements

1. The system shall be able to handle up to 1000 users simultaneously.

2. The system shall be able to handle up to 1000 transactions per second.

3. The system shall be able to handle up to 1000 transactions per second.

4. The system shall be able to handle up to 1000 transactions per second.

Dependencias

El sistema de gestión de la información debe ser capaz de gestionar la información de manera eficiente y efectiva, lo que implica la capacidad de gestionar la información de manera eficiente y efectiva.

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Xcel User Research Program

Project
Manager

Business
Manager

Product
Manager

Marketing
Manager

Sales
Manager

Finance
Manager

Operations
Manager

Human
Resources
Manager

Information
Technology
Manager

Legal
Manager

Customer
Support
Manager

Supply
Chain
Manager

Quality
Control
Manager

Research
and
Development
Manager

Compliance
Manager

Procurement
Manager

Manufacturing
Manager

Logistics
Manager

Project
Manager

Business
Manager

Product
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Marketing
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Sales
Manager

Finance
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Operations
Manager

Human
Resources
Manager

Information
Technology
Manager

Legal
Manager

Customer
Support
Manager

Supply
Chain
Manager



Test 1 Setup

What is the purpose of the Test 1 Setup?

1. To ensure that the test is fair and unbiased.

2. To ensure that the test is valid.

3. To ensure that the test is reliable.

4. To ensure that the test is consistent.



Control / Function Assignments

Control	Function	Assignment
Control 1	Function 1	Assignment 1
Control 2	Function 2	Assignment 2
Control 3	Function 3	Assignment 3
Control 4	Function 4	Assignment 4
Control 5	Function 5	Assignment 5
Control 6	Function 6	Assignment 6
Control 7	Function 7	Assignment 7
Control 8	Function 8	Assignment 8
Control 9	Function 9	Assignment 9
Control 10	Function 10	Assignment 10
Control 11	Function 11	Assignment 11
Control 12	Function 12	Assignment 12
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Control 14	Function 14	Assignment 14
Control 15	Function 15	Assignment 15
Control 16	Function 16	Assignment 16
Control 17	Function 17	Assignment 17
Control 18	Function 18	Assignment 18
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Control 42	Function 42	Assignment 42
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Control 44	Function 44	Assignment 44
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Control 92	Function 92	Assignment 92
Control 93	Function 93	Assignment 93
Control 94	Function 94	Assignment 94
Control 95	Function 95	Assignment 95
Control 96	Function 96	Assignment 96
Control 97	Function 97	Assignment 97
Control 98	Function 98	Assignment 98
Control 99	Function 99	Assignment 99
Control 100	Function 100	Assignment 100

Goals of Study One

- Examine the relationship between the use of the *Journal of Management Education* and the use of the *Journal of Management Inquiry*
- Examine the relationship between the use of the *Journal of Management Education* and the use of the *Journal of Management Inquiry* and the use of the *Journal of Management Inquiry*
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Journal of Management Education

Journal of Management Inquiry

Methodology for Study One



Highlights of Findings for Study One

- 1. **Perceptions of the role of the school principal**
 - a. Principals are perceived to be responsible for the school's success or failure.
 - b. Principals are perceived to be responsible for the school's financial health.
 - c. Principals are perceived to be responsible for the school's reputation.
 - d. Principals are perceived to be responsible for the school's safety.
 - e. Principals are perceived to be responsible for the school's academic achievement.
- 2. **Perceptions of the role of the school teacher**
 - a. Teachers are perceived to be responsible for the school's success or failure.
 - b. Teachers are perceived to be responsible for the school's financial health.
 - c. Teachers are perceived to be responsible for the school's reputation.
 - d. Teachers are perceived to be responsible for the school's safety.
 - e. Teachers are perceived to be responsible for the school's academic achievement.
- 3. **Perceptions of the role of the school parent**
 - a. Parents are perceived to be responsible for the school's success or failure.
 - b. Parents are perceived to be responsible for the school's financial health.
 - c. Parents are perceived to be responsible for the school's reputation.
 - d. Parents are perceived to be responsible for the school's safety.
 - e. Parents are perceived to be responsible for the school's academic achievement.

Study Two: Xcel + Pen

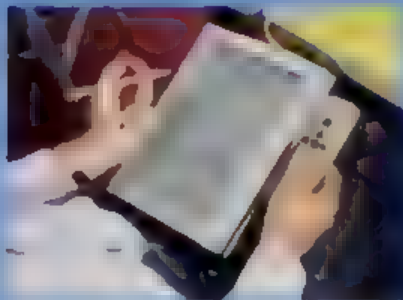


800

Results

Table 1. Demographic Characteristics of the Study Population	
Characteristic	Frequency (n = 100)
Age (years)	
< 18	10
18-24	25
25-34	30
35-44	20
45-54	15
55-64	10
65-74	5
≥ 75	5
Gender	
Male	55
Female	45
Ethnicity	
White	60
Black	20
Hispanic	15
Asian	5
Other	0
Marital Status	
Married	40
Single	30
Divorced	15
Widowed	15

Left-Handed Use Allows Bimanual Control

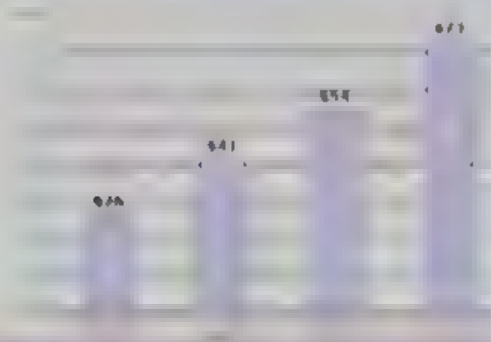


Study Two: Xcel - Pen



Study Two: Relative Value

How much would you pay for Navigation Features on your next purchase of a Laptop or Tablet PC?



Navigation Features
on your next purchase of a Laptop or Tablet PC?

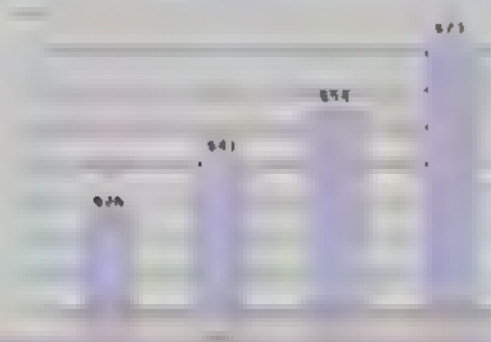
30X

Left-Handed Use Allows Bimanual Control



Study Two: Relative Value

How much would you pay for Navigation? (with and without your next purchase of a Laptop or Tablet PC)



Navigation
Navigation + Laptop
Navigation + Tablet PC
Navigation + Laptop + Tablet PC

2008

Two of the Xeels Used in Study Three

*Wheel with side
switches*



Xeel with wide-roller

Study Three: Form Factors

What Works Well (Examples)

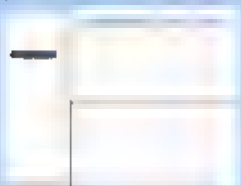
What Needs Work – Inconsistent or Impossible (Examples)

- **Consistency**
 - **Internal consistency** – no contradictions
 - **External consistency** – no contradictions with other theories
- **Reliability**
 - **Internal reliability** – consistency of items within a measure
 - **External reliability** – consistency of measures
- **Validity**
 - **Internal validity** – consistency of the relationship between variables
 - **External validity** – consistency of the relationship between variables across different contexts
- **Feasibility**
 - **Internal feasibility** – consistency of the relationship between variables within a study
 - **External feasibility** – consistency of the relationship between variables across different contexts

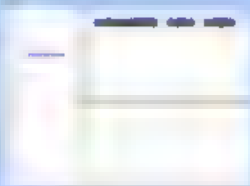
Study 4 to evaluate ergonomic performance



a



b



c



STEP UP

STEP DOWN

1. The cell is the basic unit of life. It is the smallest unit of an organism that can perform all the functions of life. Cells are found in all living organisms, from simple organisms like bacteria to complex organisms like humans.

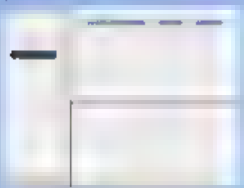
2. Cells are made up of various organelles that perform different functions. The nucleus is the control center of the cell, containing the genetic material (DNA). Other organelles include the mitochondria, which produce energy for the cell, and the Golgi apparatus, which processes and transports proteins.

3. Cells are specialized to perform specific functions. For example, muscle cells are specialized for contraction, while nerve cells are specialized for transmitting electrical signals. This specialization allows different parts of an organism to work together to maintain life.

4. Cells are constantly dividing and dying. This process is called cell turnover. It ensures that old or damaged cells are replaced by new cells, allowing the organism to grow and repair itself.

Multi-Paned Window

a



LEFT

b



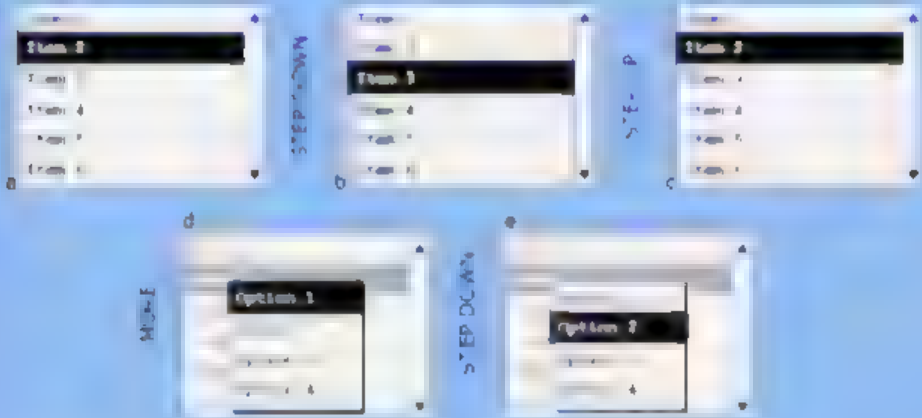
STEP DOWN

c





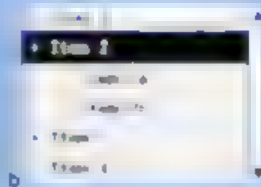
One Dimensional Arrays



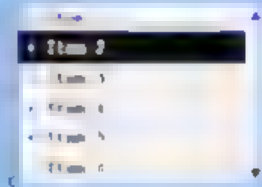
Hierarchical Lists



ENTER (expand)



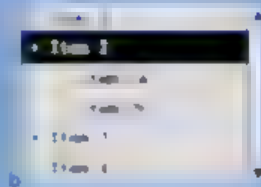
ENTER (contract)



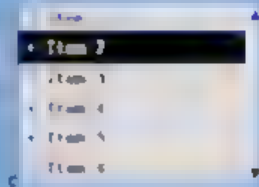
Hierarchical Lists



ENTER (Insert) Command



ENTER (Insert)



Two Dimensional Arrays

My Friends: a

```

**** Aug 2002 ****
Su Mo Tu We Th Fr Sa
    1  2  3  4  5
  6  7  8  9 10 11 12
    13 14 15 16 17 18
19 20 21 22 23 24 25
26 27 28 29 30 31
    
```

STEP DOWN

My Friends: a

```

**** Aug 2002 ****
Su Mo Tu We Th Fr Sa
    1  2  3  4  5
  6  7  8  9 10 11
12 13 14 15 16 17
18 19 20 21 22 23
24 25 26 27 28 29
    
```

STEP DOWN
(right)

My Friends: a

```

**** Aug 2002 ****
Su Mo Tu We Th Fr Sa
    1  2  3  4  5
  6  7  8  9 10 11
12 13 14 15 16 17
18 19 20 21 22 23
24 25 26 27 28 29
    
```

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1  2  3  4  5  6  7  8  9 10 11
2  12 13 14 15 16 17 18 19
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4  28 29 30 31 1  2  3  4
5  5  6  7  8  9 10 11 12
6  13 14 15 16 17 18 19
7  20 21 22 23 24 25 26
8  27 28 29 30 31 1  2
9  3  4  5  6  7  8  9
10 10 11 12 13 14 15 16
11 17 18 19 20 21 22 23
12 24 25 26 27 28 29 30
13 31 1  2  3  4  5  6
14 7  8  9 10 11 12 13
15 14 15 16 17 18 19 20
16 21 22 23 24 25 26 27
17 28 29 30 31 1  2  3
18 4  5  6  7  8  9 10
19 11 12 13 14 15 16 17
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21 25 26 27 28 29 30 31
22 1  2  3  4  5  6  7
23 8  9 10 11 12 13 14
24 15 16 17 18 19 20 21
25 22 23 24 25 26 27 28
26 29 30 31 1  2  3  4
27 5  6  7  8  9 10 11
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```

STEP DOWN

```

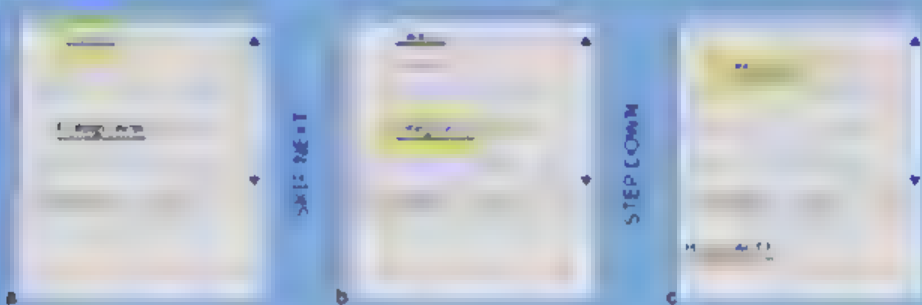
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26 29 30 31 1  2  3  4
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```

STEP DOWN

```

1  2  3  4  5  6  7  8  9 10 11
2  12 13 14 15 16 17 18 19
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25 22 23 24 25 26 27 28
26 29 30 31 1  2  3  4
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Static Linear Documents



Editable Linear Documents

I

XXXXXXXXXX

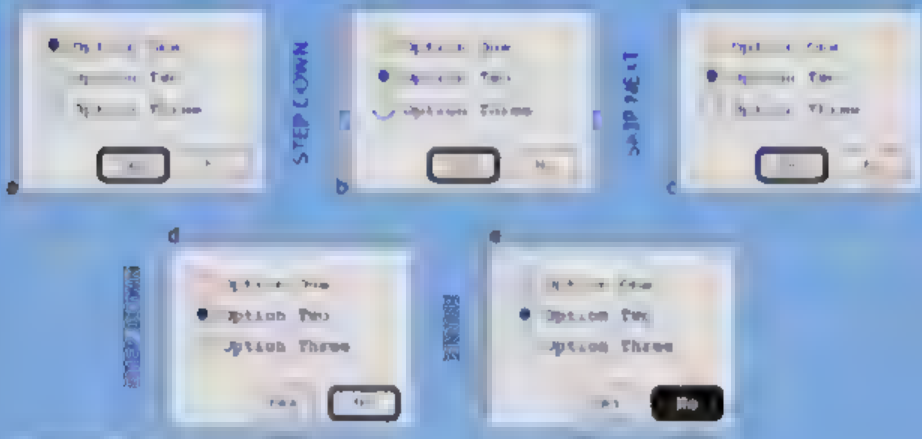
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SAYD NEXT 13

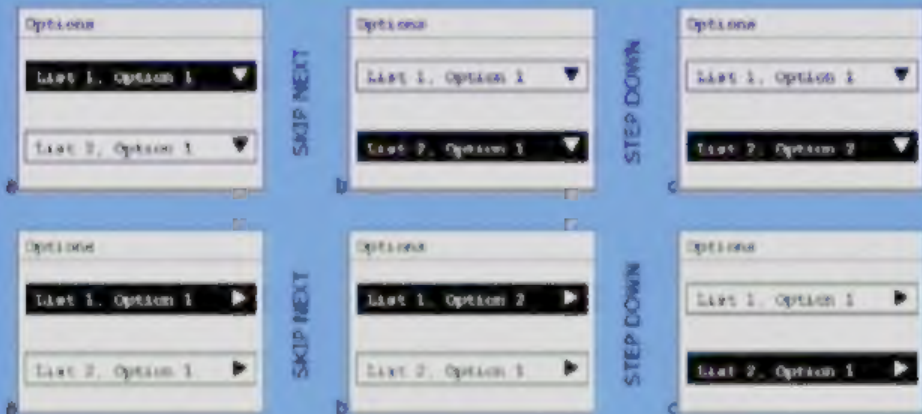
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8/10

Dialog Boxes & Control Groups



Spinners & Combo Boxes



examples:

- ▶ Dialog box w/widget group
- ▶ HTML form
- ▶ Sharepoint page or component set

MS Platform Players

- Hardware Innovation Group
- Windows / MSX
- Tablet PC
- Mira
- eHome
- Office
- SPO / Zenith
- Pocket PC / SmartPhone
- MS Hardware

Hardware Development Kit – 100x



Snap-on dogfood (hardware / software)

- ▶ design
 - ▶ development
 - ▶ testing
 - ▶ evangelism
-
- embodies specification
 - ready late-September

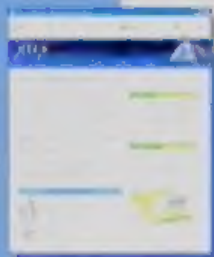
Stewardship & Reference

XEEL Workshops:

- » interaction design review

XEEL Project Site:

- » latest version of spec
- » reference papers
& research reports
- » proto info, drivers, code
- » taskforce contacts
- » component specs
- » archive of communications



[*http://innovate/xeel*](http://innovate/xeel)